UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,408	12/31/2003	Sumeet Sandhu	042390.P18465	4663

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EXAMINER
AHN, SAM K

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>03 June 2008</u>.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1,3,6-22,24,25 and 28-39</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1,3,22,24,25 and 35-37</u> is/are rejected.
7)☒ Claim(s) <u>6-21,28-34,38 and 39</u> is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on <u>31 December 2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____ .
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____ .
4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5)☐ Notice of Informal Patent Application
6)☐ Other: _____ .

DETAILED ACTION

Claim Objections

1. Claims 6-19 are objected to because of the following informalities:

Claims 6-19 should depend on an un-canceled claim, rather depend on a

canceled claim 5. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set
forth in section 102 of this title, if the differences between the subject matter sought to be patented and
the prior art are such that the subject matter as a whole would have been obvious at the time the
invention was made to a person having ordinary skill in the art to which said subject matter pertains.
Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4,22,24-26,35-37 and 40-42 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Walton et al. US 2004/0081073 A1 (Walton) in view of Raleigh

US 6,377,631 B1.

Regarding claim 1, Walton teaches a method comprising: receiving

content from a host device for transmission via two or more tones in a multicarrier

communication channel from two or more antenna(e) (receiving data from a host

device of data source 112 in Fig.1 for transmission via multiple tones or subbands in

Fig.5 in OFDM communication channel from multiple antennas 128a – 128d in

Fig.1); and multiplexing elements of the received content among at least a subset of

the two or more antenna(e) (multiplexing 416 in Fig.4 of the received data arrived

from 112 in Fig.1 wherein the multiplexing step is within 120 in Fig.1 further

illustrated as Fig.4 among at least subset of two antennas, the multiplexed data

output from 120, provided to at least two antennas 128a and 128d via 122 in Fig.1);

and interleaving the multiplexed elements across multiple tones of the multicarrier

wireless communication channel on at least a subset of the two or more antenna(e)

to generate a signal for transmission from the antenna(e) (interleaving 424a – 424d

the multiplexed elements output from 416 in Fig.4, across multiple tones of

subbands in Fig.5 of OFDM channels on at least a subset of two antennas Antenna

1 – Antenna 4). Walton further teaches wherein the received content is coded bits

(wherein the data from the data source 112 in Fig.1 is coded by 216 in Fig.2, hence

the data received by the multiplexing step are coded bits, 218 in Fig.4 receiving

Code Bits).

However, Walton does not explicitly teach the interleaving element comprises tone

interleaving and adjacent or nearly adjacent coded bits on each of the antennae are

mapped to nonadjacent subcarriers and wherein the interleaver depth determines

how many tones separate adjacent coded bits.

Raleigh teaches interleaving element comprising tone interleaving and adjacent or

nearly adjacent coded bits on each of the antennae are mapped to nonadjacent

subcarriers and wherein the interleaver depth determines how many tones separate

adjacent coded bits (tone interleaving, 420 in Fig.3 and note c.25, l.43-56,

distributing symbols that are near to be separated in bin and subchannels). Raleigh

further teaches this reduces decoder error (note c.25, l.50-51). And although

Raleigh does not explicitly teach the interleaver depth is to determine number of

tones separating adjacent coded bits, one skilled in the art would recognize that

Raleigh teaches that the near symbols are well separated through bin assignment,

thus through this bin assignment and subchannel assignment the interleaver depth

is determined to separate a number of adjacent coded bits. Therefore, it would have

been obvious to one skilled in the art at the time the invention was made to

incorporate the teaching of Raleigh in the system of Walton of performing tone

interleaving in the interleaver of Walton for the purpose of reducing decoder error

(note c.25, l.50-51).

Regarding claim 3, Walton further teaches wherein the bits are coded

using convolutional code (1/2 binary convolutional encoder, note paragraph 0035).

Regarding claim 22, Walton further teaches mapping the interleaved

coded bits to QAM symbols (note paragraph 0036 mapping the interleaved data

from 220 into different QAM symbols of 16 QAM, 64 QAM or 256 QAM, see Table

1).

Regarding claim 24, the claim is rejected as applied to claim 1 with similar

scope. Walton further teaches a diversity agent (120 in Fig.2) coupled to a

transmitter (122 coupled to the plurality of antennas in Fig.2).

Regarding claim 25, Walton further teaches the transmitter (122 coupled

to the plurality of antennas in Fig.2) coupled to the diversity agent (120), to convert

the multiplexed and interleaved content to a time domain representation (IFFT, 812

in Fig.8, wherein IFFT is well-known to one skilled in the art of converting frequency

domain to time domain) before selectively directing to the antennas (128a – 128d in Fig.2).

Regarding claim 35, the claim is rejected as applied to claim 22 with similar scope.

Regarding claim 36, Walton further teaches a cyclic prefix element (814), to dynamically introduce a cyclic shift into the QAM symbols from one antenna to another (note pr. 0105, and wherein the OFDM symbols are modulated through QAM, as explained in Table 1).

Regarding claim 37, Walton further teaches wherein the cyclic shift from antenna to antenna may or may not be greater than 1 (note paragraph 0105 shift being adjusted by a control signal).

Allowable Subject Matter

3. Claims 6-21,28-34,38 and 39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and overcome the claim objections.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Ahn whose telephone number is (571) 272-3044. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on (571) 272-3021.

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sam K. Ahn/
Primary Examiner, Art Unit 2611

12/24/2008